

Editorials

Life Cycle Management and Life CycleThinking: Putting a price on sustainability

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Life cycle management has been defined as the application of life cycle thinking to modern business practice, with the aim to manage the total life cycle of an organization's products and services toward more sustainable consumption and production (Jensen & Remmen 2005). Numerous tools and methodologies have been developed to promote eco-design and eco-innovation, though practitioners have argued that there is a need for more work on the 'implementation into business processes' (Hunkeler & Rebitzer 2005). Effective integration of life cycle thinking into existing business routines is considered a critical success factor for more sustainable business models. This raises two interesting questions. William McDonough calls regulation a design failure. Companies have put products on the market that have annoyed their customers or end users so much that they were willing to go out and buy more government. *What is preventing normal competitive forces from driving companies to develop offerings to take market share back from government regulators?* The second question relates to those environmentally responsible products that have been developed but have not achieved wide acceptance in the market place. If companies do effectively integrate life cycle thinking into their practices, *will their customers actually adopt more sustainable consumption patterns?*

Financial flows drive business

My answer to the first question is that a *failure to express the customer's value proposition in monetary terms has impeded progress in shifting to more sustainable practices*. A common objection to expressing life cycle requirements in monetary terms is that it is unethical. Nature is priceless and belongs to all humankind, not just the highest bidder. I would concur that choices regarding consuming or preserving natural systems are value-based. I would also argue that the majority of consumer purchases beyond the basic necessities are value-driven. Whether we like it or not, money is the language of business. If we are unwilling to express a requirement in dollar terms, perhaps it is inappropriate to ask business to satisfy that requirement. It might better be addressed by our local or national government. However, I suspect even public bodies will want to know how much it will cost. Just as important as monetary units, it is also critical to evaluate from the perspective of the customer.

What is his value proposition? Why should he spend his money for this product or service? Air travel is a service demanded by an expanding number of people, though one that imposes numerous social and environmental costs. Airports have imposed landing fees and restricted hours to control the impacts of exhaust emissions and noise. Engines that offer emission reductions, improved fuel efficiency, and low noise profiles offer many easily quantified benefits to airlines of expanded access to airports and reduced landing fees. There is no need for special eco-design tools and methods to quantify their value proposition. However, government-imposed fees and restrictions were necessary to convert the environmental attributes to real money flows to the airline.

Decisions drive financial flows

The second question is more complicated. There is significant, and growing interest in promoting green buildings. Non-residential buildings in the USA consume 30–40% of total energy and 25% of all water, add 30 to 40% of the atmospheric emissions, and make up 35 to 40% of municipal solid waste streams (von Paumgartten 2003). Life cycle building costs could be reduced by 25% using an integrated design approach with available technologies. Yet these cost effective options are often rejected for less efficient but lower first cost alternatives. It is too easy to blame these 'bad' choices on unenlightened management. I think a more realistic explanation is that *the system boundaries of the decision-maker do not necessarily align with the system boundaries that provide the most sustainable life cycle solution*. Building energy efficiency projects are analysed based on utility costs. However, on an annual basis companies spend 70 times as much on salaries as energy per unit floor area (Lawrence et al. 2005). Furthermore, it is quite difficult to capture the health and productivity benefits within the pricing of specific building materials or equipment. The same project will look very different to an HVAC equipment supplier, a developer looking to flip the property for capital gains, a service company that operates and maintains properties for various tenants, or to an owner-occupier. *Unless all relevant actors covering the building life cycle are involved in the decision, there is no reason to expect the final choice to reflect total life cycle*

costs. Companies will need to develop innovative business models to engage a broader range of actors to deliver more efficient life cycle system solutions.

Public decisions and private decisions

Life cycle management challenges companies to develop these innovative arrangements to better integrate into their products and services the cost of externalities, i.e. impacts that fall outside the financial transaction. To accomplish this, companies will have to model the material, energy, and financial flows across the full life cycle of their product offerings. *Who is currently paying for the externalities, and how?* What is the most economically efficient way for society to mediate these impacts? What is the opportunity to bundle a solution with the company's product that eliminates or reduces the impact? The fraction of total costs currently internalised in the product price provides a rough measure of the risk of future regulation. The uncovered externalities can be viewed as a potential market size for green offerings. This is nothing more than an eco-efficiency analysis from society's perspective. It provides business with the basic information needed to assess the risk of future environmental liabilities and to identify opportunities to take back market share from government regulation. It also highlights those pervasive or diffuse problems that are best managed with government regulation.

A societal eco-efficiency analysis is not without its own risks to corporations. For example, building indoor environmental quality has been shown to impact human health and productivity. In the United States alone, the projected gains are \$6 to \$14 billion from reduced respiratory disease, \$1 to \$4 billion from reduced allergies and asthma, \$10 to \$30 billion from reduced sick building syndrome, and \$20 to \$160 billion from improved worker performance (Fisk 2000). Most companies, however, would be reluctant to publicly quantify these effects in an attempt to market a new product offering for fear of acknowledging legal liability. Politicians would want to pass the costs to industry to avoid tax increases, and most occupants would object to the idea of paying to avoid an unhealthy environment – even if it meant a reduced total life cycle cost. There is a need for an institutional 'safe haven', where companies, regulators, and civil society advocates can gather to openly discuss these kinds of issues. Business managers and government regulators would be able to explore various strategies for guaranteeing

a vibrant economy without sacrificing environmental quality. Society would have access to objective information on the costs and benefits of their consumption choices. Such stakeholder forums are sometimes dismissed as naïve: business will not be open with the truth, and the public does not have the capacity to understand the complex and technical challenges of sustainability. The fact is, the public will make the final decision on sustainability with their everyday decisions in the marketplace and in the voting booth, with or without the benefit of this information.

Moving the private-public decision boundary

One place where companies can explore opportunities for shifting the boundary between public and private decision making is in the communities where they have significant operations. The community and local employees have a common interest in maintaining the vitality of the economic base and protecting the quality of the local environment. Companies can provide valuable resources for helping the community assess its place in the global economy. Local development officials can help companies assess the externalities imposed by its operations and are likely to be more open to innovative approaches for regulation than national agencies. The voters and employees have a direct involvement in both the public and private spheres. A variety of local experiments could be run to more quickly screen various options. Co-operative arrangements with local educational institutions could help reduce the cost of pre-commercial feasibility studies and train tomorrow's leaders for a more sustainable community. I agree that this recommendation may sound a bit naïve. Buckminster Fuller said it best, "Dare to be naïve."

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